INFINITYBOX, LLC
6460 West Cortland Street
Chicago, Illinois 60707
www.infinitybox.com

Infinitybox IPM1 Intelligent Power Management Kit Installation Manual

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Warnings

THE INFINITYBOX IPM1 KIT IS AN ADVANCED ELECTRICAL POWER DISTRIBUTION SYSTEM FOR VEHICLES. PROPER CARE MUST BE TAKEN TO FUSE THE INPUT FEEDS TO THE SYSTEM AND THE OUTPUT FEEDS FROM THE POWERCELLS. IMPROPER FUSE SELECTION CAN CAUSE DAMAGE TO THE VEHICLE ELECTRICAL SYSTEM RESULTING IN FIRE.

PROPER CARE MUST BE TAKEN TO ENSURE THAT POWER IS CORRECTLY APPLIED TO THE INFINITYBOX CELLS. REVERSING POLARITY TO THE POWER AND GROUND FEEDS WILL CAUSE IRREPARABLE DAMAGE TO THE CELLS AND WILL VOID THE WARRANTY.

THERE ARE TWO DIFFERENT KINDS OF INPUTS ON THE MASTERCELL NGX: GROUND SWITCHED INPUTS AND 12-VOLT INPUTS. APPLYING POSITIVE BATTERY POWER TO A GROUND SWITCHED INPUT MAY DAMAGE THE MASTERCELL AND WILL VOID THE WARRANTY. APPLYING MORE THAN 18-VOLTS TO A 12-VOLT INPUT MAY CAUSE DAMAGE TO THE MASTERCELL NGX AND WILL VOID THE WARRANTY.

USE CAUTION WHEN WELDING ON THE CHASSIS OF YOUR CAR OR TRUCK. IF YOU ARE GOING TO WELD, UNPLUG ALL CONNECTIONS TO ALL OF YOUR INFINITYBOX MODULES. WELDING ON YOUR CHASSIS WITH THE CONNECTORS PLUGGED INTO YOUR MODULES COULD DAMAGE THEM AND VOID YOUR WARRANTY.

ADDING ANY ELECTRONICS MODULES TO A VEHICLE WILL INCREASE THE DEMAND ON THE BATTERY. CARE MUST BE TAKEN TO MAINTAIN A CHARGE ON THE BATTERY WHEN THE VEHICLE SITS IDLE FOR PERIODS OF TIME. DEPENDING ON THE TYPE OF BATTERIES AND THE TOTAL AMOUNT OF ELECTRONICS INSTALLED IN THE CAR, THIS IDLE TIME COULD RANGE FROM MONTHS DOWN TO DAYS BEFORE THE BATTERY IS DRAINED TO THE POINT WHERE YOU CANNOT START THE ENGINE. WE STRONGLY RECOMMEND INSTALLING A DISCONNECT SWITCH THAT SEPARATES THE ELECTRICAL LOADS IN THE VEHICLE FROM THE BATTERY WHEN NOT IN USE.

Introduction

Thank you for purchasing the Infinitybox IPM1 Intelligent Power Management Kit. The Infinitybox system represents the latest in wiring and body control technology for any street rod, hot rod, restomod, kit car, race car or Pro-Touring build. Our system brings you the same technology found in all new cars in a kit that anyone can install. This is our Next Generation System that incorporates these features:

- A rock-solid and robust wiring system that is easy to install
- The same distributed wiring technology used in all modern cars today
- Powerful diagnostic features to troubleshoot easier and faster
- A programmable system that you can configure with a simple computer interface
- Flexible inputs and outputs to make wiring your switches and loads easier
- Lower steady-state current draw as compared to our legacy Infinitybox system
- More options to interface with your car or truck: switches, touch screens, remote control, passive keyless entry and rotary interfaces.

This universal kit gives you everything that you need to wire your car or truck. It includes our MASTERCELL NGX input module, two of our POWERCELL NGX output modules and all the required harnesses needed to make your connections. More details of what is in the kit can be found in the next section.

Our NGX modules are the Next Generation of our proven CAN-based power distribution technology. We listened to our customers. We added the features that you want to make your wiring easier and get you the control that you need. This Next Generation system gets you more control than our legacy system, with less external modules. Please note that our NGX system uses a completely different communication protocol than our legacy system. We made this choice to increase the functionality of the system and broaden the ways to control the system. Our Infinitybox IPM1 kit and the NGX accessories are not compatible with components from the legacy systems.

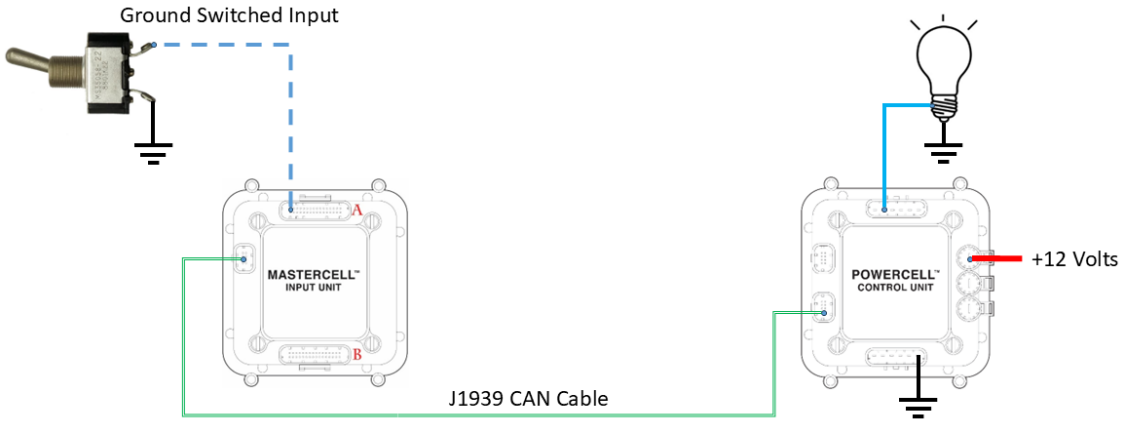
We have accumulated a significant knowledge base. There are decades of experience summarized on our website. This information can be found in our blog and in the Resources section. Most importantly, we have an experienced and dedicated team of car enthusiasts who are here to help answer your questions. Don't ever hesitate to reach out to our team with questions.

The Infinitybox system works very differently from a traditional wiring harness. With a traditional wiring harness, you have one box of fuses and relays mounted centrally in the car. Every switch connects to this box. If the amount of current required for a load is low enough, the switch can control it directly. Things like cooling fans, fuel pumps and some lights draw significant amounts of current so the switches in the wiring harness connect to

relays. Every load in the car has to connect to this box too, creating large and complicated wiring harnesses.

The Infinitybox system works differently. We split a traditional wiring harness into separate modules. These modules each have a specific function and you put them in your car where you need them.

This diagram shows how the Infinitybox system works.



Your switches connect to the MASTERCELL. Examples of switches include your turn signal stalk, headlight switch, brake switch, ignition switch, door pin switches and reverse light switches. This could also include things like the fuel pump trigger and the cooling fan trigger from an ECU.

Your loads connect to the POWERCELL. These include things like your headlights, high beams, turn signals, parking lights, ignition power, starter solenoid, horn, cooling fan, fuel pump and interior lights. The POWERCELL contains the fuses to protect your wiring plus solid-state relays to turn your loads on and off.

The MASTERCELL and POWERCELL connect to each other through the CAN (Controller Area Network) cable. This cable passes data between the cells. The MASTERCELL sends commands to the POWERCELL, telling it to turn outputs on and off. The POWERCELL sends data back to the MASTERCELL, confirming that it did what it was told. This architecture lets you put the MASTERCELL close to your switches to keep that wiring short. It also lets you put POWERCELLs where you need them in your car or truck and keep the wiring to your loads short. It is only a 2-wire data connection between the MASTERCELL and POWERCELL. There is no direct connection between your switch and the load. It is a data connection between the MASTERCELL and POWERCELL. This is the same architecture found in all modern cars on the road today.

Here are more technical details on our MASTERCELL NGX and POWERCELL NGX.

MASTERCELL NGX- Universal Switch and Input Module

- Number of Switch Inputs:
  - 38 Ground Switched Inputs.
  - 6 Positive Switched Inputs.
- Number of High-Side Outputs: 8
  - Four dedicated to left & right turn signal indicators, high-beam indicator and gauge illumination. Four universal outputs.
  - Maximum output current draw: 3-amps combined.
  - Outputs fused with 3-Amp Mini™ fuse installed under the clear cover.
- inVIRONMENT Heating & A/C Feature Integrated
  - Mating connector included for Vintage Air Gen 4 and Gen 5.
  - Heat & A/C can be controlled through inLINK NGX or inCONTROL.
  - Other Heat & A/C system options are available. Contact our Technical Support Team for more information.
- Other Inputs (Advanced Features- Contact our Technical Support Team for details)
  - 0 to 5-volt analogue input.
  - Pulse input for Tachometer Signal.
  - Pulse input for Vehicle Speed Sensor.
- Electrical Parameters:
  - Input Voltage: 10 to 18 VDC. Powered through CAN cable.
  - Steady-State Current Draw: 20 mA nominal with inSIGHT backlight off.
  - Incoming power protected against Load Dump per ISO16750-2.
- Physical Details:
  - 7 ¼" X 6 ½" X 2".
  - Housing sealed to IP65.
  - Connectors are sealed Aptiv/Delphi Micropack.
  - All plastics are UL94V0.
  - Drawings and 3D models are available upon request.
- Communication Protocol: J1939
  - Data Rate: 250 kb/s.
  - System PGNs and CAN commands are available upon request.

POWERCELL NGX- Universal J1939 Output Module

- Number of Outputs: 10
  - Smart MOSFET- High-Side Switched Outputs.
  - Each output is rated to 25-Amps continuously with a maximum current rating of 120-Amps for the entire POWERCELL NGX.
  - All 10 outputs can be soft-started.
  - Outputs 1 through 8 can be pulse-width modulated.
- Electrical Parameters:
  - Input Voltage: 10 to 18 VDC.
  - Each output protected with standard Mini™ fuse.
  - Steady-State Current Draw: 20 mA nominal.
  - Incoming power protected against Load Dump per ISO16750-2.
  - All outputs are suppressed to properly switch inductive loads.
- Active Current Monitoring:
  - The current level for all 10 outputs is continuously broadcast.
  - Resolution is 0.125 Amps.
  - Current levels are broadcast every 250 ms.
- Physical Details:
  - 7 ¼” X 6 ½” X 2”.
  - Housing sealed to IP65.
  - Connectors are sealed Aptiv/Delphi Connectors.
  - All plastics are UL94V0.
  - Drawings and 3D models are available upon request.
- Communication Protocol: J1939
  - Data Rate: 250 kb/s.
  - System PGNs and CAN commands are available upon request.
  - POWERCELL NGX PGNs are set using address headers under clear covers.

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Contents of IPM1 Kit

Basic Components

1	MASTERCELL NGX	(852-081A8)
2	POWERCELL NGX	(852-082A8)
2	POWERCELL A Harnesses	(858-043)
2	POWERCELL B Harnesses	(858-045)
1	MASTERCELL NGX A Harnesses	(858-240)
1	MASTERCELL NGX B Harnesses*	(858-244)
1	3-Way NGX CAN Cable	(858-048)
4	8 Gauge Power Connector Wires	(858-042)

Wiring Accessories

1	4 Position Megafuse Holder Set	(904-204)
1	Bag of Assorted Fuses	(904-301)
1	4 Gauge 3/8 Ring Terminal	(913-018)
1	4 Gauge 5/16 Ring Terminal	(913-015)
4	8 Gauge 5/16 Ring Terminals	(913-010)
1	Length of 4 Gauge Wire	(WZ4-2)

Sealing Plugs

1	CAN Dummy Plug	(869-027)
1	CAN Terminal Resistor	(869-029)
2	Power Connector Wire Plugs	(869-026)

Installation Steps

STOP & READ CAREFULLY!

You are about to wire your car with the next generation Infinitybox system. There is no system on the market that can give you the power and flexibility that you can get with Infinitybox. There are a few things you need to consider as you go through this process.

- Read the Instructions
  - We've been evolving these instructions since we started our business in 2008. We have learned from our customers' questions. These lessons are summarized here. We are always adding more information to our website. Check it out at www.infinitybox.com.
- Find your Configuration Sheet
  - Every kit includes a printed copy of your configuration sheet. It should be stapled to the back of this manual. This is your roadmap to wiring the car. It will identify which input wires connect to your switches and which output wires connect to your loads. We have several different configurations and yours will be specific to your kit.
- Safety
  - The electrical wiring system controls everything in your car. It is what really makes it go. Fuel delivery, starting the engine, managing the ignition, keeping things cool, safety, audio and entertainment all need reliable electrical power to work correctly. Follow our instructions carefully.
- Use the Right Tools
  - Stay away from the hardware store and sketchy sellers on Amazon when buying tools or supplies to wire your car. Give our technical support team a call if you need help getting what you need to do the job correctly. Companies like Del City, Waytek Wire and Terminal Supply Company are experts in automotive wiring products. They sell quality tools, terminals and wire.
- Ask Questions
  - Wiring is a daunting process for anyone. The worst thing that you can do as you go through the process is not ask a question, no matter how basic it may seem. We have a great team of tech guys that can help with any question.
- Read the Instructions
  - Did we mention that you should read the instructions? There is also a wealth of specific wiring examples in the Resources section of our website at www.infinitybox.com.

Each section of this manual will have detailed instructions on what you need to do. There will be a checklist that you should complete at the end of each section. Please use this as a tool to help make your installation simple and efficient.

STEP 1: Mounting the Cells

The Infinitybox system is a modular, multiplexed wiring system. This means that there are multiple remote cells that are mounted in the car where you need them.

The MASTERCELL connects to your switches. You will mount that close to your switches. The MASTERCELL has the low-current outputs needed to drive the indicators on your dash. The MASTERCELL is also your main diagnostics tool for the system. You should locate it in the vehicle where you can get reasonable access to view the inSIGHT LCD screen, remove the cover and push the buttons under the cover. You should also mount the MASTERCELL in a location where you can easily plug and unplug the harnesses for maintenance.

The POWERCELLs control your loads (lights, cooling fans, ECU power, starter solenoid, horn and other switched accessories). In most installations, you will mount one POWERCELL in the front of the car and one POWERCELL in the rear. The POWERCELL holds the fuses that protect the wires in your harness. You need to have access to the POWERCELL to be able to change fuses if they ever were to open. You should also mount the POWERCELL in a location where you can easily plug and unplug the harnesses for maintenance. Lastly, there are indicator LEDs on the POWERCELL that give you valuable troubleshooting and diagnostic information. Mount your POWERCELLs in places where you can easily see the LED indicators next to each fuse.

The POWERCELLs are designed to be mounted under the hood. They were designed and tested to survive the extreme temperatures, chemicals and vibrations found in the engine compartment. The one warning about mounting POWERCELLs under the hood is to keep them clear of exhaust headers and ignition coil wires.

The mounting locations are identical for all the Infinitybox MASTERCELL and POWERCELLs. The mounting points were designed for a ¼" stud, ideally a 5/8" long shoulder screw. You can use any mounting hardware that you choose. Take care not to crush the mounting points by over-tightening the hardware.

The POWERCELLs carry all the electrical current in your system. They are designed to carry up to 120-amps continuously per cell. In most applications, you can mount them anywhere in the vehicle in any orientation. If your continuous current draw through a POWERCELL will exceed 80-amps, it is recommended that the POWERCELL be in an open area with free air flow. The POWERCELL should be mounted with the fins on the heat sink oriented vertically. Contact our technical support group with questions on current usage and mounting.

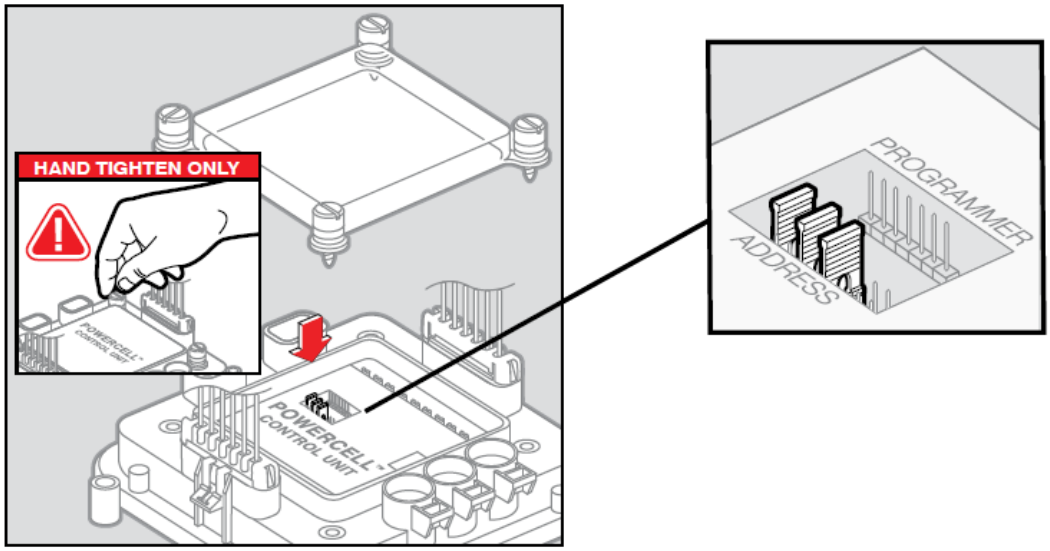
NOTE: When installing your Infinitybox system in your car, it is important that you keep the clear, protective covers on the cells. This is to keep dirt, metal chips, welding splatter and other debris from entering the cells. Improper protection of the cells while installing them will cause damage to the electronics and void the warranty.

ALSO NOTE: The MASTERCELLs and POWERCELLs are only sealed when all the connector ports are plugged. There are dummy plugs to seal the unused CAN ports and power input ports. If you do not install all the plugs in the system, you run the risk of water, moisture, dirt and debris entering the cells. This could damage the cells and will void the warranty.

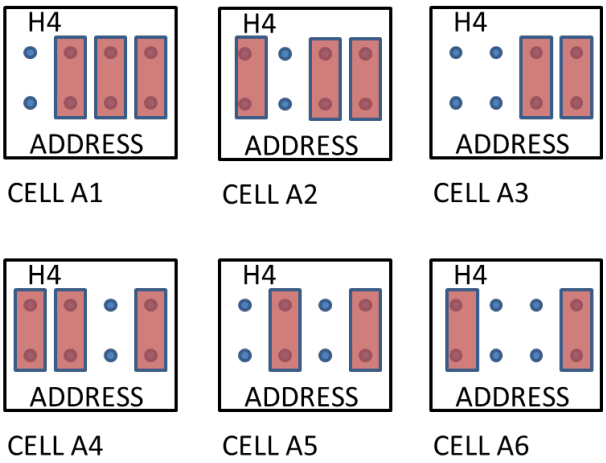
The address on the POWERCELL must be set to match the address defined in your configuration sheet. Your front POWERCELL address must be set as 1. The rear POWERCELL must be set as 2. If you have additional POWERCELLs or inMOTION cells in your system, your configuration sheet will identify the address numbers for those cells. Check your configuration sheet and follow the steps below to set the address jumpers. This picture shows where the address headers are located under the POWERCELL cover.

The POWERCELLs only learn their address when they power up. If you change the location of the address jumpers, you must completely remove power from the system then power it up again.

LOCATING THE ADDRESS



This picture shows how to properly orient the jumpers on the headers to set the cell address.



Checklist for Step 1- Mounting the Cells

- ☐ Did you choose the best locations for your cells considering troubleshooting, replacing fuses and other maintenance?
- ☐ Are your cells mounted clear from high-voltage ignition coil wires and radiated heat from exhaust headers?
- ☐ Do you have your front & rear POWERCELLs set to the correct address?

STEP 2: Running Power from the Battery

Each POWERCELL needs to connect directly to the positive terminal on your battery. This is where the POWERCELL gets the power needed to control the switched loads in the car. Your kit includes two 8-gauge red power feeds per POWERCELL. The black connectors on the ends of these cables plug into the round power input ports on the POWERCELLs.

Also included in your kit is a block of 60-amp fuses. There are two of these Mega fuses per POWERCELL. Each of these fuses is designed to properly protect the lengths of 8-gauge wire. If one of those 8-gauge wires were to get shorted to ground, the fuse is designed to be the weakest link in the chain. The fuse will open before the 8-gauge wire can get hot and cause damage. You want to mount this fuse holder as close to the battery as possible. The goal is to minimize the length of unprotected wire in the electrical system.

Follow these steps to properly connect your battery to the POWERCELLs in your kit.

Step 1: Mount the 4-position fuse block as close as possible to the positive terminal of your battery.

Step 2: Connect the positive terminal of the battery to the common busbar of the fuse holder. Use the included length of 4-AWG cable and the two 4-AWG ring terminals to make this connection. We recommend protecting the exposed metal parts of the ring terminals with heat-shrink tubing to reduce the chance of accidental connections to the chassis.

Step 3: Cut the red 8-gauge power feed wires to length and crimp on the included 5/16" 8-gauge ring terminals. We recommend protecting the exposed metal parts of the ring terminals with heat-shrink tubing to reduce the chance of accidental connections to the chassis. We also recommend reviewing the path of the 8-gauge cables as they run through the car. Make sure that you are using grommets and other protection devices to keep the insulation on these cables from getting damaged due to vibration and other mechanical stresses.

Step 4: Connect the POWERCELL power feeds to the fuse holder. Torque the nuts between 70 and 120 in-lbs (8 to 14 Nm).

Step 5- Plug the power feeds into the circular input connectors on the POWERCELLs. The three circular power input connectors are identical. You can use any two of the three circular power input connectors.

Step 6: Insert dummy plugs into the unused power input ports on both POWERCELLs.

NOTE: The POWERCELLs must have a separate battery power feed from the starter cable. Do not connect a POWERCELL to the starter side of the starter cable. The POWERCELLs in the vehicle must be powered directly from the battery.

NOTE: A battery disconnect is strongly recommended with the Infinitybox system. You are adding a very sophisticated electrical system to your vehicle. We do what we can to minimize the amount of steady-state draw but there will always be a small drain on the battery when the vehicle is sitting idle. A battery disconnect or our inRESERVE Active Battery Management System is strongly recommended to disconnect the battery when the vehicle is not being used.

Checklist for Step 2- Running Power from the Battery

- ☐ Are both of your POWERCELLs powered from the same block of Megafuses?
- ☐ Do you have your Megafuse holder connected directly to the battery on the shortest run of 4-AWG wire as possible?
- ☐ Have you protected the 8-gauge power feeds from damage as they run through the body of your car or truck?
- ☐ Did you tighten the bolted connections on the Megafuse holder?
- ☐ Did you close the covers on the Megafuse holders?
- ☐ Did you install the power dummy plugs into the unused power input ports on the POWERCELLs?

STEP 3: Connecting the CAN Cable

The CAN cable connects the MASTERCELL to the POWERCELLs in your system. It passes commands between the different cells to turn outputs on and off. CAN stands for Controller Area Network. We are using the same J1939 CAN protocol as commercial truck and heavy-duty vehicle manufacturers. The CAN cable also provides battery voltage to power the MASTERCELL.

There is one CAN port on the MASTERCELL and two CAN ports on each of the POWERCELLs. The two ports on the POWERCELLs are identical so you can connect the CAN cables into either port.

The CAN cable that comes with your IPM1 Kit has a plug on both ends and a plug in the middle. One length of the CAN cable will have 4 wires: black, green, yellow and red. The other length of CAN cable will only have two wires: green and yellow. The red and black wires are power and ground respectively. The MASTERCELL gets its power through the CAN cable from one of your POWERCELLs. The MASTERCELL must be connected to the length of CAN cable with the red & black wires in it. The other length of that cable must be plugged into a POWERCELL.

The CAN plugs are keyed so that they can only plug into the MASTERCELL or POWERCELL one way. The locking tab on the connector should face towards the outside of the cell. Do not force these plugs into the CAN ports on the cells. If it is difficult to insert them, check the pins in the port to make sure that they are straight.

You may shorten or lengthen your CAN cable as required for your specific vehicle. There is no minimum length for a CAN cable. Contact our technical support team if you are going to lengthen your CAN cable beyond 20 feet in length. We use 22-gauge TXL wire in these cables. You can source this wire yourself or give our team a call and we can help you get this wire. You can also contact our team about having us build custom cable lengths for your specific project.

Once you have your CAN cables routed and plugged into your cells, install the included terminating resistor plug into the open CAN port on the POWERCELL that is furthest away from the MASTERCELL on the length of your CAN cable. The terminating resistor is the plug with the letter “R” marked on the top. Plug the CAN dummy plug into the open CAN port on the other POWERCELL to keep the cell sealed.

NOTE: Keep the CAN cables away from any high-voltage ignition coil wires.

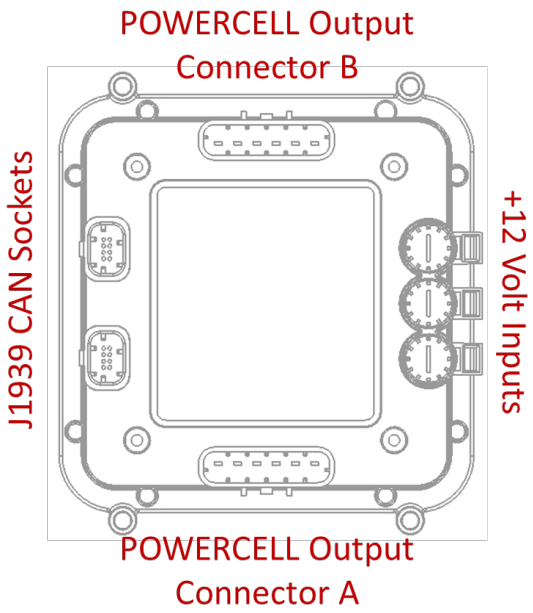
Checklist for Step 3- Connecting the CAN cables

- ☐ Do you have power and ground properly connected to your MASTERCELL through the CAN cable?
- ☐ Is your CAN cable routed away from high-voltage ignition coil wires?
- ☐ Did you install the CAN dummy plug?
- ☐ Did you install the CAN Terminator Resistor?

STEP 4: Wiring the POWERCELL Outputs

Consider each POWERCELL as a fuse and relay box. It gets power from the battery and commands from the MASTERCELL. It supplies battery power to a load in your vehicle when you turn on a switch connected to the MASTERCELL.

There are two output harnesses for each POWERCELL that are included with your kit. This picture shows which output harness connects to the output ports on the POWERCELL. These harnesses are not keyed so make sure that you are connecting them into the proper ports on the POWERCELL.



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These tables summarize the wire colors for the POWERCELL A & B Output Harnesses.

POWERCELL A Connector Pinouts

Cavity Identification	Function	Reference Wire Color
A	Ground	Black
B	Output 10	Tan
C	Output 9	Orange
D	Output 8	Green
E	Output 7	Blue
F	Output 6	Yellow

POWERCELL B Connector Pinouts

Cavity Identification	Function	Reference Wire Color
A	Ground	Black
B	Output 1	Brown
C	Output 2	Violet
D	Output 3	Light-Green
E	Output 4	Light-Blue
F	Output 5	White

Each POWERCELL output harness has a black wire. These wires must be connected to ground. This should be done locally at the POWERCELL. Make sure that you have a good electrical connection to the chassis. This means you must have a metal to metal connection to ground. Take care to remove all dirt, paint, grease, oil or powder coating to get to bare metal for this connection. We do not recommend using the screws used for mounting the POWERCELL as the point for the ground connection. Use a separate connection directly to the chassis.

The configuration sheet is your key to wiring your vehicle. It shows you the MASTERCELL input wires that connect to your switches and the POWERCELL output wires that connect to your loads. These are all done by wire color. Your configuration sheet is specific to your kit. It should be stapled to the back of this manual. If you have questions about the configuration sheet or have lost it, give our technical support team a call.

All the switched loads in your car will connect to a POWERCELL output. When the output is on, the POWERCELL supplies battery voltage on the output wire. You connect this wire to your load then ground your load to the chassis. See the Resources section of our website for specific wiring diagrams for lights, turn signals, fans and other electrical loads.

There is a fuse holder for each output wire on the POWERCELL located under the clear cover. These fuses are designed to protect the wires in case they get accidentally shorted to ground. The size of the fuse depends on the smallest size of wire connected to the POWERCELL output, not necessarily what is connected to the output. The following table gives recommended fuse sizes for wire gauges.

Wire Gauge (AWG)	Recommended Fuse Size for TXL Insulation
20	7.5
18	10
16	15
14	25

The wire gauge used in the standard POWERCELL output harnesses is 14-AWG.

Each POWERCELL output wire can carry up to 25-amps. This means that you can have multiple loads connected to a single output. For example, you can use the ignition output on your system to control multiple loads. This could include power to your ECU or coil, your gauge power and the power to your stereo. When the ignition is turned on, all these functions will turn on. Our Splice Saver Kit gives you an easy way to connect multiple loads to a single POWERCELL output. Check out the accessories section of our online store to purchase Splice Saver Kits.

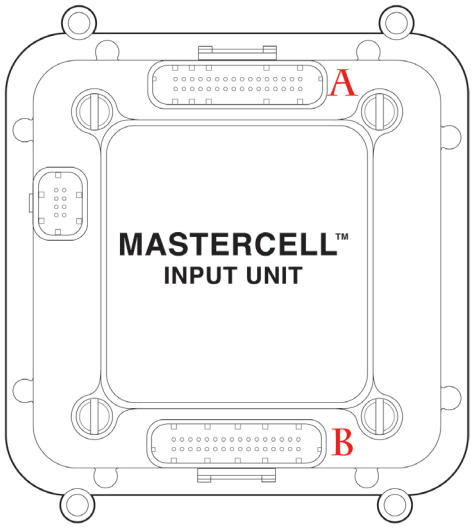
Checklist for STEP 4: Wiring the POWERCELL Outputs

- ☐ Do you have the output harnesses plugged into the correct output connector ports?
- ☐ Do you have the black wires from each output connector connected to a good ground on the chassis?
- ☐ Did you follow the wire colors on the configuration sheet that came with your kit?
- ☐ Did you install fuses in the POWERCELL for each load?

STEP 5: Wiring the Switches

Wiring the switches in your car to your MASTERCELL inputs is the easiest part of the process. Every function in your car has a MASTERCELL input assigned to it. See the configuration sheet that came with your kit for these details.

There are two input connector ports on the MASTERCELL. The A connector is located above the screen. The B is located below the screen. Your configuration sheet will detail which connector has the input wires that you will need for your switches. The following diagram shows the locations of the A & B ports on the MASTERCELL.



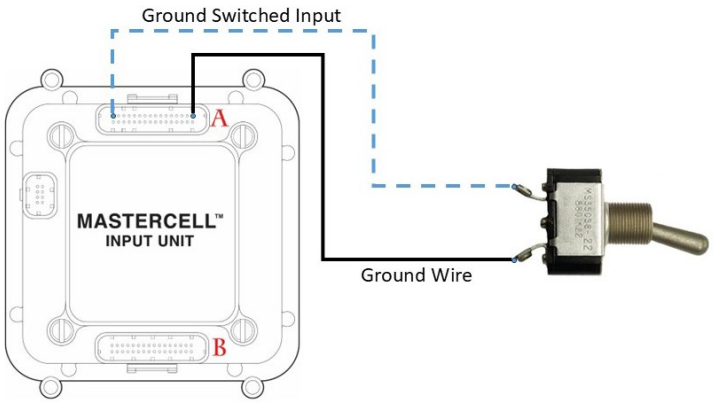
The MASTERCELL NGX gives you two different types of inputs to connect to your switches. The majority of the inputs are ground switched. These inputs need to be connected to ground for the MASTERCELL to turn on an output on the POWERCELL or an inMOTION NGX. There are also 12-volt switched inputs that you can use for special situations including cooling fuel pump or cooling fan triggers from an ECU.

Even though they are not intuitive to everyone, the ground switched inputs are the easiest to use. To turn on a ground switched input, the MASTERCELL input needs to be connected to ground. The MASTERCELL input will connect to one side of your switch. You will then ground the other side of the switch. When you turn the switch on, the switch closes. This connects the MASTERCELL input to ground. You have two different options for getting this ground connection. There are black ground reference wires in the MASTERCELL A connector or you can ground your switch directly to the chassis. If you are going to use the chassis as the ground connection, it is important that you have a good metal-to-metal connection to the chassis. You must remove any rust, dirt, grease, oil, paint, powder coating or any other debris.

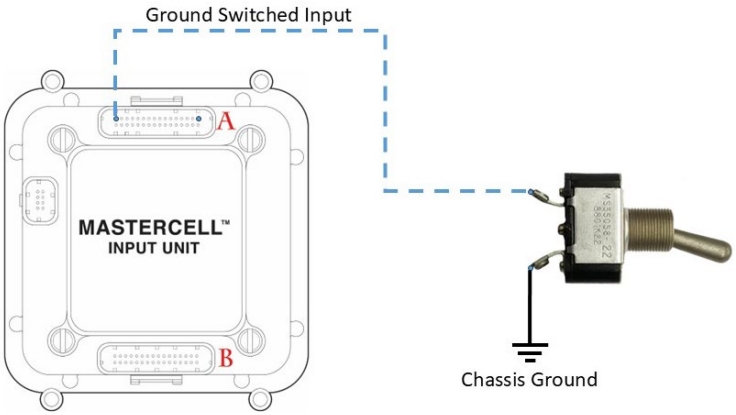
The MASTERCELL ground switched inputs take about 0.001 Amp (1 milliamp) to turn on. This lets you connect practically any switch to the input to trigger an output. You can use the original switches that came with your car and never run the risk of damaging the contacts. You can also connect practically any aftermarket switch to a MASTERCELL ground switched input to control your outputs.

If you are using the ground inputs on the MASTERCELL, it is important that you do not connect positive voltage to these inputs. Doing this could damage the input and void your warranty.

This diagram will show you how to connect your switch to a MASTERCELL ground input using one of the ground reference wires in the MASTERCELL Harness.



This diagram will show you how to connect your switch to a MASTERCELL ground input using the vehicle chassis as a ground.

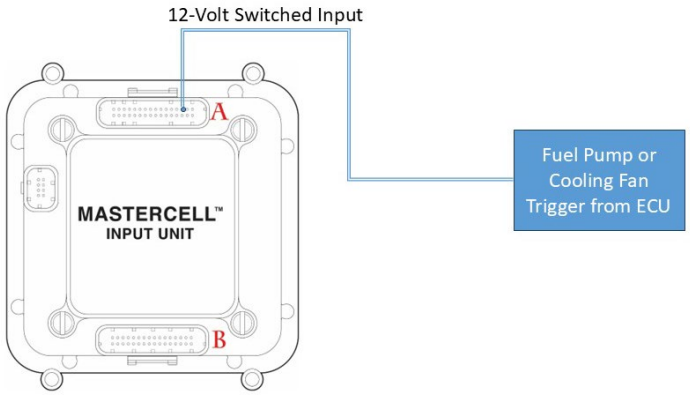


No matter how complicated the switch is, there is almost always a set of contacts that will close together in the on position that can be used to trigger a MASTERCELL input. You can usually figure this out in a few minutes with a continuity tester or a multi-meter set to measure resistance. In most cases, you can ground the terminal where battery power came

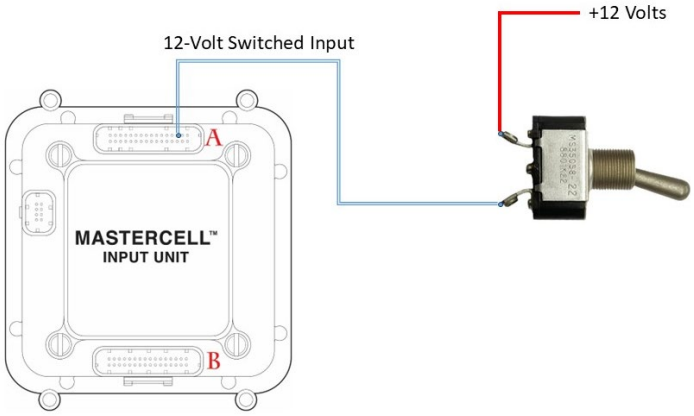
into the switch, then connect the MASTERCELL ground input to its corresponding terminal. We also have a large catalogue of switch examples on our website. Look for the Resources section at www.infinitybox.com.

We have designed six 12-volt triggered inputs into the MASTERCELL. These can be used for anything in your electrical system that sends out a positive trigger to turn something on. The most common examples include cooling fan and fuel pump triggers from fuel injection systems. Not every ECU works the same way so carefully read your manual. We also have a broad catalogue of wiring diagrams for the most common EFI systems on our website. Check these to figure out your exact wiring.

This diagram shows you how to connect a positive trigger from an ECU to the 12-volt inputs on the MASTERCELL.



This diagram shows you how to connect a switch connected to 12-volts from the battery to trigger a 12-volt input on the MASTERCELL.



There are too many different options of headlight switches, brake pedal switches, ignition switches, etc. to include in this manual. Every OEM had their own designs. The Infinitybox website has an extensive catalogue of switch wiring for practically every popular car dating back to the 1950's. Check out the Resources section of the website. If you cannot find a wiring diagram for your switch, give our team a call and we can help you out.

Your kit includes both the MASTERCELL A & B universal harnesses. You can easily remove any unneeded wires from your harnesses to clean up your installation. See the Resources section of our website for more information on how to remove unused wires from the connectors.

Checklist for STEP 5: Wiring the Switches

- ☐ Did you follow the wire colors on the configuration sheet that came with your kit?
- ☐ Did you make sure that your switches are wired so that no battery voltage can be applied to the ground switched inputs?
- ☐ Do you have a good connection for the ground side of your switches either using one of the black wires in the MASTERCELL harness or a metal-to-metal connection to the chassis?

STEP 6: Wiring Your Dash Indicators

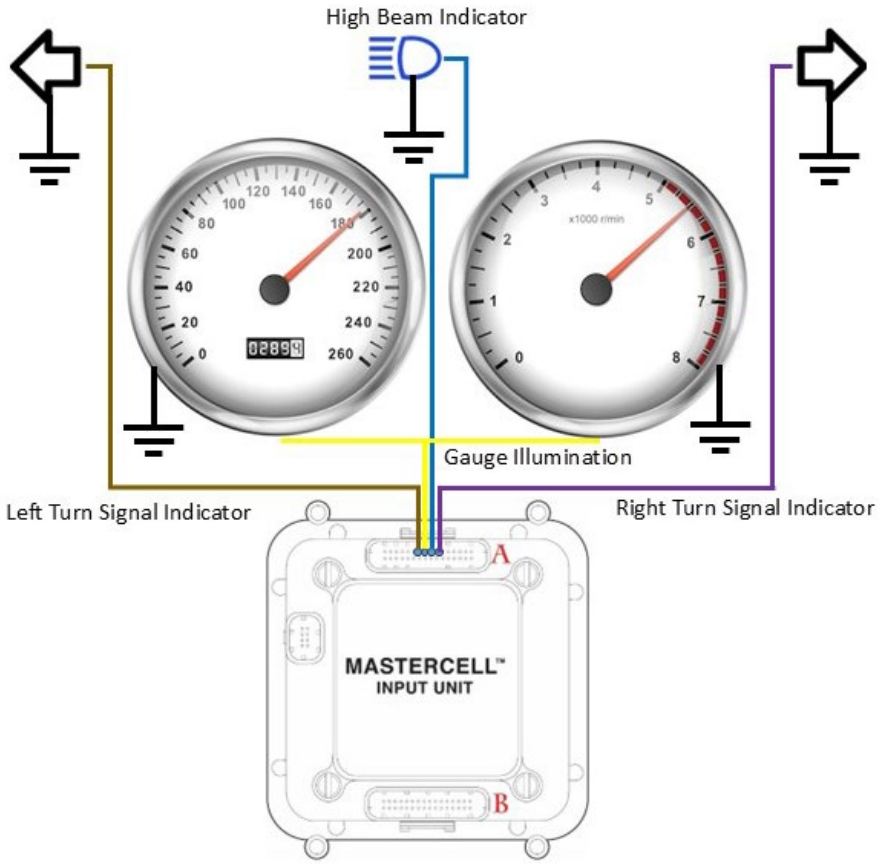
In the previous steps, you wired all the core functions in the car. You connected the MASTERCELL to your switches and we connected the POWERCELL to the loads in your car. The next step is to control the indicators on your dashboard. These typically include the turn signal indicators and the high-beam indicator. When you turn on your left turn signal, the front and rear POWERCELLs are going to blink the turn signal lights. You also want to know that the turn signals are flashing by looking at the indicator on the dash. You also want to know if your high-beams are on by checking the indicator on your dash. The MASTERCELL NGX that is included in your IPM1 kit has the ability to control these indicators directly. Since your MASTERCELL is located behind the dash, wiring these indicators becomes very easy. The configuration sheet that came with your kit has a page that identifies the wire colors and the MASTERCELL connector for the indicator outputs. Follow that to connect the wires to your indicators.

The outputs on the MASTERCELL NGX can supply up to 3 Amps total. If your indicators are LEDs, they typically draw about 0.050 Amps (50 milliamps) each. If your indicators are incandescent, these can draw up to 0.25 Amps (250 milliamps). It is important that you check the current draw for all these indicators on together with a multimeter. Give our Technical Support Team a call if you need help making this measurement. You can also use the indicator output on the MASTERCELL to power your gauge illumination, as long as the total current draw for the gauge illumination is less than 1 Amp. You can measure this current draw with a multimeter to confirm. The gauge illumination output is powered when the parking lights are turned on from their respective MASTERCELL input.

The first 4 indicator outputs on the MASTERCELL NGX are pre-programmed for the left & right turn signal indicators, the high-beam indicator and the gauge illumination. These indicator outputs will automatically turn on when their functions are turned on. There are 4 additional outputs that can be configured. Contact our Technical Support Team for more information.

There is a Mini™ fuse installed under the MASTERCELL clear cover, to the right of the inSIGHT LCD screen. This fuse protects the outputs on the MASTERCELL NGX. If you draw an excess of current from these outputs, this fuse will open. Do not install a fuse with a rating higher than 3-Amps in the MASTERCELL NGX.

The following picture shows a typical wiring diagram for your turn signal indicators, high-beam indicator and gauge illumination using the indicator outputs on the MASTERCELL NGX.



Check List for Step 6- Wiring Your Dash Indicators

- ☐ Have you checked the wire colors and the MASTERCELL connector for your indicator outputs on your Configuration Sheet?
- ☐ Have you checked the current draw for your indicators and gauge illumination?

STEP 7: Testing the System

Once the hardware is properly set up, connect battery voltage through the power input harnesses to the POWERCELLs. After 3 seconds, the system will be running and ready to test.

There are three steps that you should follow when you start to test your system: Check CAN communication between the cells, check the switches and check the outputs. The following section will walk you through these steps. There is a much more comprehensive diagnostic and troubleshooting guide available in the Resources section of our website.

Checking CAN Communication

The MASTERCELL sends commands to the POWERCELLs connected to the system. Every second, the MASTERCELL sends a command to verify that all the cells are connected and healthy. We call this a heartbeat. When the system is up and running correctly, you will see a heartbeat indicator on all the cells. On the MASTERCELL, this is the COM light below the screen. It is a blue light and will blink approximately once per second. On the POWERCELLs, there is a similar blue light towards the center of the cell under the clear cover. This will blink approximately once per second when it is operating correctly.

There are indicators on the MASTERCELL for CAN Hi and CAN Lo. These indicate communication between the cells. These red and green lights will flash randomly. This is absolutely normal. There are corresponding CAN Hi and CAN Lo lights near the address header under the clear cover on the POWERCELLs. They will flash randomly like the indicators on the MASTERCELL. We use these lights for advanced diagnostics. The vast majority of our customers will never need to be concerned about these lights.

If the blue heartbeat indicators on the MASTERCELL or POWERCELLs are on but do not flash, that means that the cell is getting power from the battery but is not communicating with the other connected cells. Check the CAN cables and the connection to the MASTERCELL.

The inSIGHT LCD screen on the MASTERCELL is a powerful tool for understanding what is going on in your system. You can confirm that all the cells are communicating by pressing the HOME button under the MASTERCELL screen. This will bring up a list of system options. Use the SCROLL UP and SCROLL DOWN buttons to move the cursor to the SYSTEM INFO option, then press SELECT. The following picture shows this menu screen.

All the cells connected to the MASTERCELL will be displayed. The first line will read A0. That is the MASTERCELL. The front POWERCELL will be listed as A1 and the rear POWERCELL is listed as A2. If you see these three lines, your system is communicating correctly. As you add additional cells and accessories to your system, they will be displayed under SYSTEM INFO.

Checking Switches

The inSIGHT screen on the MASTERCELL gives you detail on how the system is working. You can use this to verify that the switches are connected correctly. Press the HOME button to get to the main menu. Use the SCROLL UP and SCROLL DOWN buttons to move the cursor to the SWITCH STATES option then press SELECT. You will see the following screen.

This screen displays the state of the MASTERCELL inputs in real time. The top row corresponds to ground switched inputs 1 through 16. The second row corresponds to ground switched inputs 17 through 32. The first 6 digits on the third row correspond to ground switched inputs 33 through 38. The last 6 digits on the third row correspond to the 12-volt switched inputs. If a digit is a 0, that means that the MASTERCELL sees that input as off. If the digit is a 1, that means that the MASTERCELL sees that input as on. The state of the switches is updated in real time. You can use this screen to make sure that your switches are wired correctly to their corresponding inputs. To exit this screen, press and release the HOME button.

There is a much more comprehensive description of the troubleshooting and diagnostic screens on the MASTERCELL under the Resources tab at www.infinitybox.com.

Checking the Outputs

Just like the MASTERCELL, the POWERCELLs have built in diagnostic tools to help check the system. There is a white LED (light emitting diode) next to each fuse under the clear cover of the POWERCELL. This white light can be either off, on bright or on dim. The state of the lights can tell you exactly what is going on with your outputs.

If the white light is off, that means that the POWERCELL output is off and you have a good connection through the load to ground. If the white light is glowing dimly, that means that you do not have a connection between your POWERCELL output and ground. It could mean that you have a broken wire, a burned-out light bulb or an open fuse. Check the wiring, the fuse and the load.

Please note that some loads may have a high resistance to ground. These could include LED lights and some EFI systems. The white indicator LED on the output that corresponds to these loads may glow dimly, even though they are wired correctly.

If the light is bright, that means that the POWERCELL output is on. You can turn your switches on and off and verify that the LED for that specific output is going bright when the switch is on. Use your configuration sheet to verify that the correct output numbers are turning on with your switch.

If you have diagnostic or troubleshooting questions, download the Infinitybox Diagnostic and Troubleshooting Guide from the Resources section at www.infinitybox.com.

Warranty Information

Infinitybox, LLC ("Infinitybox") warrants against any defects in materials and workmanship to the Product's INFINITYBOX™ modules, wiring harnesses and accessory modules for a period of one (1) year from the first date of purchase. Subject to the terms of this warranty described below, Infinitybox will replace any such defective Product that is returned to Infinitybox within the one (1) year period from initial purchase. Replacement of any defective part or Product will not extend the applicable warranty period.

The warranty does not apply to: (i) any Product that is not installed in compliance with the applicable Product documentation; (ii) any defect in, or failure of, the Product resulting from an accident, shock, negligence, water immersion or misuse; (iii) any Product that has been modified, adjusted, repaired, or disassembled by any party other than Infinitybox; or (iv) any defect other than in materials and workmanship.

This warranty covers only the original purchaser of Product purchased from an Infinitybox authorized dealer in the United States. In order to receive warranty service, purchaser must provide Infinitybox with a copy of the receipt stating the dealer name, product purchased and date of purchase. Products found to be defective during the warranty period will be replaced (with a product deemed to be equivalent or better) at the discretion of Infinitybox.

Infinitybox's sole liability for any defective Product is limited solely to the replacement of Product pursuant to this warranty. Infinitybox reserves the right to replace any repairable parts with new or refurbished parts.

INFINITYBOX DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY, SUCH AS WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PURPOSE. IN NO EVENT SHALL INFINITYBOX BE LIABLE FOR ANY PUNITIVE, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LIABILITY FOR LOSS OF USE, LOSS OF PROFITS, LOSS OF PRODUCT OR BUSINESS INTERRUPTION HOWEVER THE SAME MAY BE CAUSED, INCLUDING NEGLIGENCE.

Contact Information

The INFINITYBOX™ Intelligent Power Management System
is a product of
Infinitybox, LLC
6460 West Cortland Street
Chicago, Illinois 60707
(847) 232-1991
sales@infinitybox.com
www.infinitybox.com